

GOVERNMENT OF THE PROVINCE OF SASKATCHEWAN
DEPARTMENT OF AGRICULTURE

FIELD HUSBANDRY CIRCULAR No. 8
THE TILLAGE OF PRAIRIE SOD

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FUNCTION OF TILLING PRAIRIE SOD.

The function of tilling prairie sod in semi-arid climates is three-fold:

- (1) To kill the native vegetation,
- (2) To store moisture in the soil and conserve it there,
- (3) To prepare a suitable seed bed or "home" for the plant.

KILLING THE NATIVE PRAIRIE PLANTS.

The native vegetation consists of fibrous rooted grasses, creeping rooted grasses and various native shrubs such as rose bushes and wolf willow. To kill these ploughing is necessary.

Ploughing in the dry season is more effective in killing the native plants than at any other time. The following figures give the average monthly precipitation for many points in Saskatchewan for the ten years 1899-1908:

January	.70	May	2.10	September	1.65
February	.66	June	3.49	October	.69
March	1.03	July	2.28	November	.61
April	.72	August	2.41	December	.60
					Average 16.94

Fibrous rooted grasses can be killed by once ploughing, even though it be in the rainy season, if followed by reasonable surface cultivation. They are, of course, more likely to be completely killed out if ploughed in a dry time.

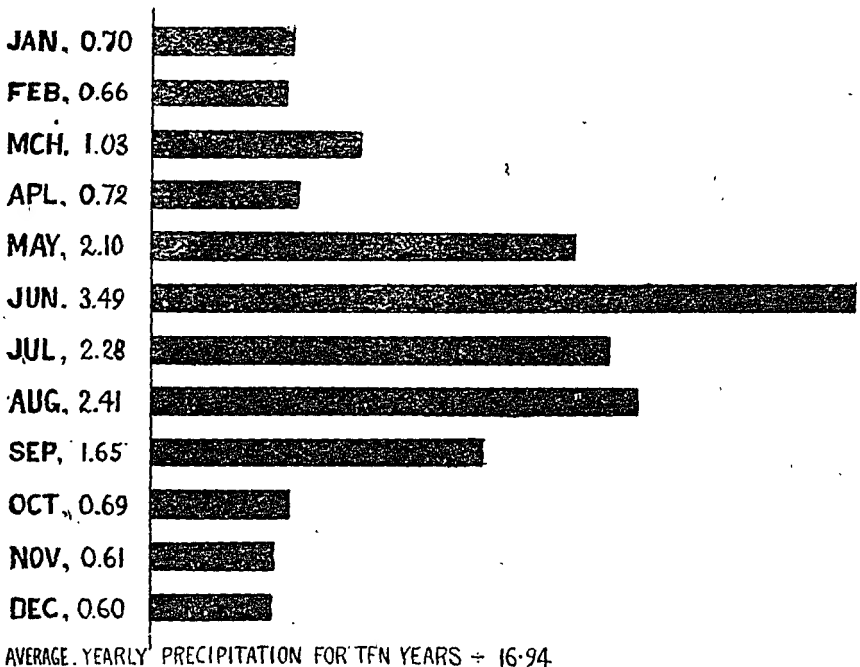
Creeping rooted grasses, when ploughed early in the rainy season, are only partly killed. If ploughed in the dry time following our rainy season, more of them will be destroyed.

Native perennial shrubs are either fibrous or creeping rooted and each type may be controlled in much the same manner as the grasses of similar habit, with this exception, that land carrying a long or dense

growth of shrubs does not lend itself so well to a second ploughing in the same season, although this varies with the height and woody nature of the shrubs appearing.

STORING MOISTURE.

Moisture is "stored" in new land by preventing the "run off" and by facilitating the absorption of rain water by the soil. The "run off" occurs on new land, as on fallow, at the time of the melting of the snow in the spring and sometimes after heavy downpours of rain. On prairie land, unlike land to be fallowed, practically nothing can be done to prevent the moisture from melting snow running away. On the other hand most of the "run off" after heavy rains may be entirely prevented.



Reference to the figures showing the monthly precipitation in Saskatchewan will show that May, June and July are our rainy months, and that in June on the average about one-fifth of the whole year's moisture falls, or much more than in any other month of the year. It is after our heavy rains that the greatest run off occurs, and, of course, this is increased on rolling or hilly land.

Unfortunately, it is a peculiarity of our climate that both precipitation and temperature are apt to vary considerably from the average, thus sometimes rendering less effective the farmer's best plans. But until we can foretell with considerable accuracy the weather conditions weeks in advance, the precipitation of the average season should be our best guide in planning tillage operations for the control of moisture.

Ploughed land absorbs more of the rainfall than unploughed land. Breaking done early in the rainy season will, therefore, give greater

opportunity for the soil to absorb moisture. Breaking crosswise of a slope, if possible and practicable, will enable the soil to absorb more of the precipitation than breaking done up and down a slope.

CONSERVING MOISTURE.

As is the case in fallowed land and "stubble" land, moisture is lost from the prairie (1) by being pumped out of the ground by plants; (2) by evaporation in the air; and (3) by drainage through coarse textured soils.

The plants on prairie land are the native grasses and shrubs. These use up moisture in just as large quantities as weeds or domestic crops, and in June they generally make their greatest growth, and therefore, in that month use the most moisture. The sooner, then, this growth can be prevented, the greater the amount of water conserved.

Evaporation, or the passing away of soil moisture into the air, can be lessened by cultivating the surface of the breaking so as to form a loose layer of soil two to four inches deep. The sooner this loose layer can be created after breaking, the more moisture will be conserved.

The loss of moisture by drainage through the soil is not large in climates having a low rainfall. Some water is lost in this way on very gravelly soils, but these constitute a very small percentage of our present cultivated land. To improve the retentive capacity of such soils, organic matter must be added either in the form of manure, green crops ploughed under, or by the use of grasses, the extensive surface roots of which add "fibre" to the soil.

THE SOIL—THE PLANT'S "HOME."

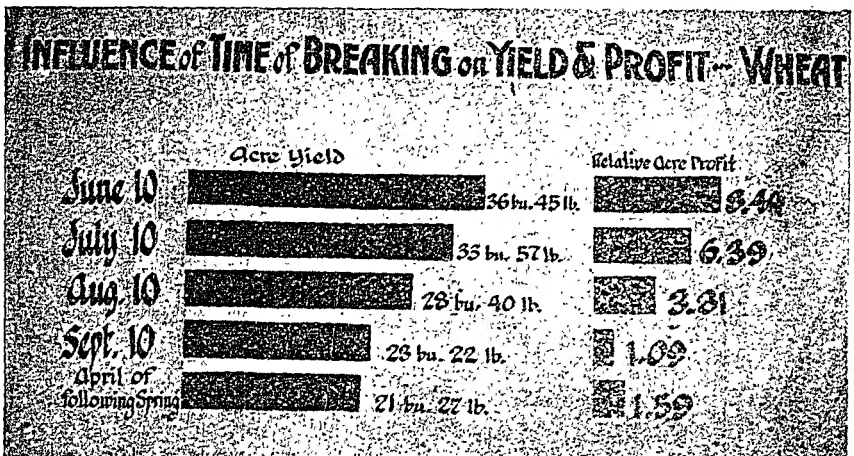
After killing the native plants of the prairie and providing a supply of moisture for the crop, it is important that the soil be left in such condition that the requirements of germination and future growth may be easily and abundantly supplied to the seed and the roots of the crop. If the native vegetation has been killed and a large supply of moisture stored and conserved, there will be sufficient available plant food. But in addition, it is necessary (1) that a "seed bed," a loose layer of soil which functions also as a mulch, be provided; (2) that the furrow slice be firmly in contact with the subsoil so that subsoil moisture may not be prevented from rising quickly to the crop; and (3) that the soil be prepared in such a manner that the moisture will be within two to three inches of the surface so that too deep seeding may not be necessary. Most of these conditions will obtain if the operations previously mentioned have been done timely and well.

SOME DESIRABLE PRACTICES.

1. *Break early in dry regions.*—Land broken the first week in June in 1911 and backset in August of the same year, produced 24 pounds more flax per acre in the first crop and 5 bushels 56 pounds more wheat per acre in the second crop than adjoining land that was broken the third week in June but otherwise similarly cultivated.

Land broken the second week in June in 1911 and surface cultivated produced 17 bushels 57 pounds more flax in 1912 than adjoining land broken the fourth week in June and otherwise cultivated the same. No second crop was taken on this land, consequently the second crop's yields are not available.

In the year 1915, the yield of wheat on land broken in June of the previous year was 37 bushels 1 pound; in July 33 bushels 37 pounds; in August 28 bushels 8 pounds; in September 23 bushels 4 pounds; and in April of the same year, 22 bushels 15 pounds. In the same year the yield of barley on June breaking was 43 bushels 11 pounds; on July breaking 38 bushels 30 pounds; on August breaking 33 bushels 20 pounds; on September breaking 25 bushels 12 pounds and on breaking done in April 18 bushels 4 pounds. Flax in a similar test yielded 19 bushels 2 pounds on June breaking; 16 bushels 37 pounds on July breaking; 15 bushels 10 pounds on August breaking; 14 bushels 45 pounds on September breaking and 13 bushels 55 pounds on spring breaking.



The year 1915 was the most favourable year ever experienced in the history of crop growing in Western Saskatchewan. Ordinarily late fall and early spring breaking gives much smaller yields than those reported, but the same relative differences always occur.

Early breaking provides a receptive soil for the June and July rains, thus lessening the run off; but its greatest value results from killing the native vegetation, and thus keeping in the soil the enormous amount of water that would otherwise be transpired into the atmosphere by the growing of these plants.

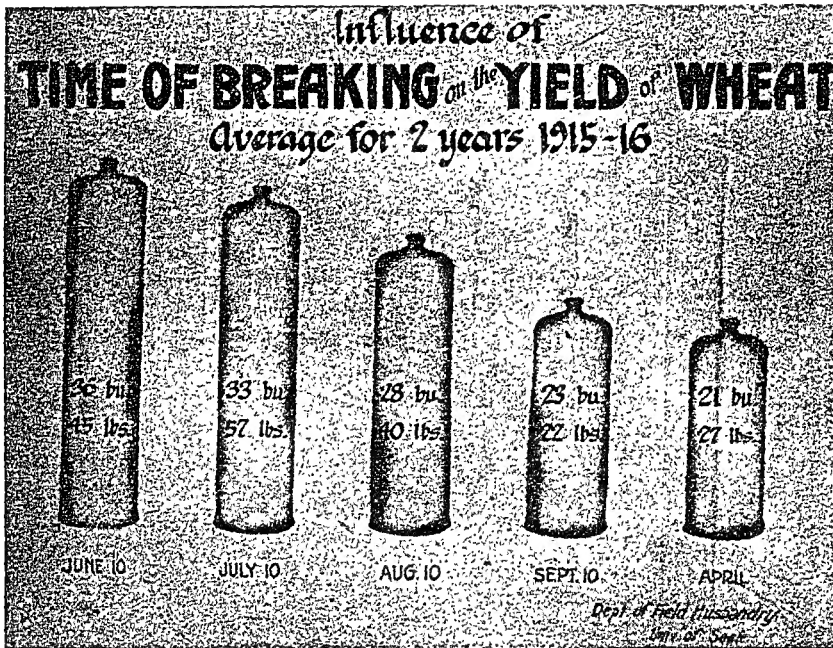
Early breaking stores and conserves more moisture and produces a heavier but rather later crop than breaking done at a later date; it also unfortunately provides better conditions for the roots of the grass ploughed under to spring into growth again, hence the greater need for "back-setting" early breaking.

2. *Turn the furrow over flat.*—The furrow slice should be turned over flat on the furrow bottom, otherwise the sod does not rot satisfactorily and the furrow slice itself dries out too much. It has been observed

that where good ploughing is done and the furrow slice turned down flat, rather than on edge, that the sod rots better and larger returns are invariably secured.

In addition to turning the furrow slice over flat, it is important that no skips occur. Poorly ploughed breaking does not kill all the grass and the result is that in the second and often in subsequent crops this pest increases and seriously lessens the yield. Grass in stubble fields is one of the chief causes of low yields. Good ploughing, when breaking prairie sod, is as important as any other phase of the breaking operations.

3. *Pack after breaking.*—For the same reason that sod or prairie land should be turned over flat, it should also be pressed firmly against



the subsurface soil. For this purpose the land packer or the planker gives excellent results. In the dry summer of 1914 the only breaking on which the sod was thoroughly rotted was breaking that had been well packed. In a wet season the necessity for packing is not so great.

In low lying soils, the sod of which is composed largely of creeping rooted grasses, it is sometimes advisable to leave the land unpacked for a few days to permit the furrow slice to dry out and thus aid in killing the grass.

4. *Disc deep breaking as soon as possible after it can be done without turning up sods.*—Moisture evaporates rapidly from the surface of a firm soil. As soon as discing can be done without turning up unrotted sod, it should be done. On some soils it can be done very soon after breaking, but on others it often has to be left until the sod is at least partially decayed. The sooner it can be done the more moisture it will conserve.

5. *Cultivate sufficiently during the season to maintain a mulch and to control native plants.*—Crops sown on spring breaking the year the work is done seldom produce satisfactory yields. The reason lies in the lack of moisture in the soil. The native grasses pump out the water almost as fast as the soil absorbs it. This explains why it is advisable in dry climates to cultivate prairie land for nearly a year before sowing a crop on it.

If, however, prairie land is broken and the surface left uncultivated, a large amount of moisture will be lost. The use of the discs and harrows often enough to maintain a mulch is essential after the sod has decayed sufficiently to permit these implements to do good work.

6. *If the grass and small shrubs are not killed, backset after the sod has decayed.*—It has been pointed out that one of the functions of tilling prairie land is to kill the native vegetation, and another to store moisture. It has been shown that early breaking results in the storage of more moisture but does not kill the grass as well as later breaking. To get a large supply of moisture without the grass should be our aim. This can be accomplished by early shallow breaking and by backsetting after the sod has rotted. The first ploughing gives opportunity for the storage and conservation of more moisture, and the last kills any grass that may have escaped the first ploughing.

The first crop after breaking and backsetting is often not much larger than the first crop after deep breaking that has been surface cultivated, but the second and later crops are invariably better. In the year 1913, the second crop of wheat on land that was broken and back set yielded 14 bushels 36 pounds of wheat per acre, while the second crop on adjoining land that had been broken deep and surface cultivated was but 4 bushels 11 pounds per acre. The difference was due altogether to the presence of grass in the once ploughed breaking. In fairness to the breaking that was not backset it should be pointed out that for the second crop the land in this experiment was double disced and double harrowed but not ploughed.

7. *Don't backset if sod has not rotted.*—In very dry summers it is very difficult to backset and less difficult to kill the prairie grasses than in wet summers. In 1914 in the Saskatoon district it was physically impossible to backset any breaking except that which had been done early and well packed down. In addition to this difficulty, it was noticed that even where backsetting was done the unrotted sod produced a very unsuitable seed bed and one that required an unreasonable amount of surface tillage before it was considered satisfactory.

8. *Land intended to be backset should be broken shallow, that not to be backset, deeper.*—Deep breaking cannot be backset satisfactorily, but it controls native plants better than shallow breaking. Under these circumstances it is generally advisable in farm practice to plough shallow in the early part of the breaking season and deeper at the later end. The early breaking can then be backset after the breaking season is over. "Shallow" and "deep" as used here are relative terms. A depth of 2 to 4 inches is generally considered shallow breaking and 4 to 6 inches deep breaking. "Backsetting" is done usually about 2 inches deeper than the "breaking."

9. *Pack and harrow backsetting.*—The moisture stored in the subsoil of breaking must be kept within reach of the seed and plant roots. In order that this condition may obtain, firming the loose soil after backsetting is advisable. It is at the same time important that a shallow layer of loose soil be maintained on the surface of the field in order that the loss of moisture by evaporation may be lessened.

10. *Scrub land must be treated somewhat differently.*—On land that carries a growth of bushes and small wood, backsetting is seldom practicable for the reason that the growth ploughed under does not decay in time to permit it to be backset. Under these conditions very deep ploughing followed by packing and thorough surface cultivation is the best procedure.

Early breaking on scrub land has all of the advantages of early breaking on prairie land, but because of the fact that most of our scrub land is in the more humid parts of the province, it is not essential that the ploughing be done as early as in the prairie sections. At the same time it is well to keep in mind that the earlier the work is done the more moisture there will be conserved, and the earlier the rubbish is ploughed under the quicker it will decay and leave the soil in good physical condition.